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MILITARY HANDBOOK  
INSPECTION, TESTING, AND MAINTENANCE  
FOR  
FIRE PROTECTION SYSTEMS

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## ABSTRACT

This handbook was produced to provide guidance for the maintenance of engineered fire protection features in Department of Defense (DOD) facilities. Concerns for property, equipment, and personnel were among the comprehensive considerations included in this handbook to ensure safety of human life, continuity of mission, and to minimize injuries and damage to property and equipment. This handbook implements the *National Technology Transfer & Advancement Act*, Public Law 104-113, March 7, 1996, Section 12 (d) (3) identifying an exception to consensus technical standards required to implement policy objectives and activities within the area of fire protection engineering for the Department of Defense.

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## FOREWORD

This handbook has been developed from an evaluation of facilities at DOD establishments, from surveys of maintenance methods, and from selection of the best practices of the Naval Facilities Engineering Command (NAVFACENGCOM), Army Corps of Engineers, Air Force Office of the Civil Engineer, Deputy Chief of Staff for Installations and Logistics Headquarters Marine Corps, other Government agencies, and the private sector. This handbook is based on recognized reliability centered maintenance concepts and reliability centered risk management. This handbook implements the *National Technology Transfer & Advancement Act*, Public Law 104-113, March 7, 1996, Section 12 (d) (3) identifying an exception to consensus technical standards required to implement policy objectives and activities within the area of fire protection engineering for the Department of Defense. This handbook was prepared using, to the maximum extent feasible, model building codes, National Fire Codes, industrial standards, and other recognized standards. Do not deviate from this criteria in DOD facilities without prior approval of the respective component office of responsibility—U.S. Army, HQ USACE/CEMP-E; U.S. Navy, NAVFACENGCOM HQ Code 150; U.S. Marine Corps, HQMC Code LFF-1; U.S. Air Force, HQ AFCEA/CES; Defense Logistics Agency (DLA), HQ DLA-D through DLSC-BIS; Defense Mapping Agency (DMA), HQ DMA (HRH); and all other DOD components, DUSD (IA&I) Industrial Affairs & Installations via the DOD Standing Committee on Fire Protection Engineering.

Recommendations for improvement are encouraged. Submit recommendations for approval via the respective component office of responsibility and the DOD Standing Committee on Fire Protection Engineering. Approved recommendations will be forwarded to Commander, Naval Facilities Engineering Command (NAVFACENGCOM) (Code 150), Washington Navy Yard, 1322 Patterson Avenue, SE, Suite 1000, Washington, DC 20374-5065; telephone commercial 92020 625-9177, DSN 325-9177, facsimile commercial (202) 685-1577, DSN 325-1577; electronic mail [gottje@hq.navfac.navy.mil](mailto:gottje@hq.navfac.navy.mil) or Air Force Civil Engineer Support Agency, Technical Support Directorate (AFCEA/CESM), 139 Barnes Drive, Suite 1, Tyndall AFB, FL 32403-5319; telephone commercial (850) 283-6315, DSN 523-6315; facsimile commercial (850) 283-6219, DSN 283 6219; electronic mail [fred.walker@afcesa.tyndall.af.mil](mailto:fred.walker@afcesa.tyndall.af.mil); message AFCEA TYNDALL AFB FL//CESM//.

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## Section 1: INTRODUCTION

1.1 Scope. This military handbook, MIL-HDBK, establishes guidance for the inspection, test and maintenance (ITM) of engineered fire protection features in Department of Defense (DOD) facilities. Concerns for property, equipment, and personnel were among the comprehensive considerations included in this handbook to ensure safety of human life and continuity of mission, and to minimize injuries and damage to property and equipment. The provisions of this handbook are applicable to DOD facilities located on or outside of DOD installations, whether acquired or leased, by appropriated or non-appropriated funds, or third party financed and constructed. Facilities covered by this document include all types of buildings and their contents, structures, whether considered temporary or permanent, mobile and stationary equipment, waterfront facilities, outside storage, and shore protection for ships and aircraft. Matters relating to fire department operations, staffing, and equipment are not covered by this handbook.

1.2 Objective. This manual applies performance based reliability centered maintenance methodology to identify the minimum required inspection, test and maintenance tasks necessary to achieve a 99% overall system reliability to respond to an actual fire event. This manual considers the unique conditions existing on DOD installation where the service/agency has complete control of the facility and occupants.

1.2.1 Qualifications. These test and maintenance tasks are expected to be executed by craft persons qualified/trained in the maintenance and repair of the specific type of fire protection system or subsystem. Qualified/-trained includes personnel completing the DOD Fire Alarm Systems course or DOD Fire Suppression Systems course at the Sheppard Technical Training Center, Sheppard AFB, TX or the NAVFAC Fire Alarm Systems course at Naval Public Works Center, Norfolk Naval Operations Base, Norfolk, VA. Also, personnel holding NICET certification or other recognized journeyman/craftsman level qualifications for specific fire protection system maintenance and repair.

1.2.2 Other Inspections. This manual also identifies certain inspection tasks that should be performed during other regularly scheduled inspection/evaluations of the facility. Fire prevention personnel, safety personnel, maintenance craft persons or other individuals could perform these inspection tasks.

1.2.3 Acceptance. This manual is not intended to be used for the acceptance/commissioning of installed fire protection systems.

1.3 Cancellation. This handbook cancels and supersedes NAVFAC MO-117, Army TM 5-695, Air Force AJFMAM 32-1059 (AFM 91-37) *Maintenance of Fire Protection Systems*, September 1989.

1.4 Criteria. This handbook implements the National Technology Transfer and Advancement Act, Public Law 104-113, March 7, 1996, Section 12 (d) identifying an exception required to implement policy objectives and activities within the area of fire protection engineering for the DOD. Fire protection feature inspection, test, and maintenance criteria shall conform to the frequency requirements of this handbook. The technical tasks, when required by this handbook, shall be performed in accordance with manufacturer's instructions. The task frequencies in the *National Fire Codes*, published by the National Fire Protection Association (NFPA), shall not be used except as indicated in paragraph 1.4.1. Modification of the requirements

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of the *National Fire Codes* is consistent with the application statement found in each standard in the *National Fire Codes*. For example::

**"NFPA Standard 25—Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems 1-2.3\* Application.** *It is not the intent of this document [NFPA 25] to limit or restrict the use of other inspection, testing or maintenance programs that provide an equivalent level of system integrity and performance to that detailed in this document. The authority having jurisdiction shall be consulted and approval obtained for such alternative programs."*

The requirements of this handbook are intended to provide not less than a 99% reliability or availability on demand (fire). The DOD Standing Committee on Fire Protection Engineering is made of the authority having jurisdiction from each service or agency (See paragraph 1.4.3).

**1.4.1 Absence of Criteria.** When a specific application is not covered by the criteria cited herein, follow national building codes, recognized industry standards, and standard engineering practices. In the absence of such technical information, contact the DOD component authority having jurisdiction (refer to paragraph 1.4.3).

**1.4.2 Conflicts in Criteria.** If a conflict exists between this handbook and any other DOD document, referenced code, standard, or publication, this handbook shall take precedence. The individual DOD components may issue technical guidance which shall take precedence. The Army and Air Force issue engineering technical letters (ETLs); the Navy issues Planning and Design Policy Letters (PDPs); and the DLA issues technical policies.

**1.4.3 Authority Having Jurisdiction (AHJ).** The term "AHJ" as used in the codes and standards referenced in this handbook shall mean the component office of responsibility, i.e., U.S. Army HQ USACE/CEMP-E; U.S. Navy, NAVFACENGCOM HQ Code 150; U.S. Marine Corps, HQMC Code LFF-1; U.S. Air Force, HQ AFCEA/CES; DLA, HQ DLA-D through DLSC-BIS; NIMA, Mission Support (Admin Services); and all other DOD components, DUSD (IA&I) Industrial Affairs & Installations via the DOD Standing Committee on Fire Protection Engineering.

**1.5 Waivers.** Where a valid need exists, waivers for deviation from established criteria may be approved by the AHJ, if an alternate fire protection engineering inspection, test, or maintenance action providing equivalent fire protection and life safety is approved. Requests for approval shall include justification, hazard analysis, cost comparison, criteria used, and other pertinent data. Lack of funds or cost savings are not considered sufficient justification for deviation from established criteria. Waivers shall apply only to specific requests under consideration and not to cases with similar circumstances.

**1.5.1 Air Force.** Air Force installations may adopt alternative inspection, test, and maintenance (ITM) frequencies demonstrated to provide not less than 99% reliability on demand.

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## Section 2: ITM TASKS AND FREQUENCIES

2.1 Reliability Centered Maintenance Methodology. The purpose of Inspection, Testing, and Maintenance (ITM) of fixed fire protection systems is to assure that these systems will work when called upon. The Reliability Centered Maintenance analysis identifies what can cause a system to fail on demand. Then it addresses how these defects can be detected and corrected before a fire (demand) occurs. The outcome of an RCM analysis is to develop a list of ITM Tasks and the frequency they must be done to achieve a desired reliability. For this manual that reliability is .99 as outlined in Section 1.2. The methodology applied to develop this ITM Guide is summarized in a separate report "Risk Based Reliability Centered Maintenance of DOD Fire Protection Systems, January 1999. The model used in the report assumed a system demand of 1/50 years and a task effectiveness (ITM done right) of 99%.

This RCM effort must emphasize the effectiveness of the task (is it the right thing to do and is it done right) and its timeliness (is it done before a demand). The resulting list of tasks and frequencies, therefore, must consider frequency and probabilities of failures and demands.

### 2.2 ITM Task Descriptions and Frequencies

2.2.1 Task Descriptions. The ITM tasks outlined in Tables 1 through 21 were selected to assure the fire protection would function when called upon.

A trend to supervise components increases the likelihood that conditions or faults will be detected without an inspection activity. In these cases, the ITM task is to respond to the alarm and to test the supervisor device (e.g., valve tamper switch) periodically. The frequencies reflected in the tables below credit the improved fault or condition monitoring by reducing the required inspection frequency. Different frequencies are recommended for monitored an unmonitored fire alarm control equipment. Monitored is defined as a system for which alarm, trouble, and supervisory alarms are transmitted to a supervisory station.

Some tests should be event driven. For example, a main drain test is intended to verify the open condition of a control valve to a sprinkler or water spray system. This test need only be done when the control valve has been operated for maintenance or testing. The frequency indicated in the tables is after valve operation.

Some of the tasks called out by NFPA are not included in the tables. These are tasks which either do not improve the operability of the systems because: 1) the faults they detect are not significant impairments, 2) the faults are detected by other tasks or means, or 3) the faults will be self-evident (fix it when it breaks) without significant impairment to the system.

Some of these inspection activities are included in building overall inspection activities but not part of the ITM program. These inspection activities are listed at the end of each ITM table for information purposes. Each DOD activity has different fire prevention, safety, facility condition, and related inspection/evaluation programs these inspection activities are expected to incorporated into those existing efforts. These inspection activities were not included in the model used to development the 99% reliability requirements.



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2.2.2 Fire Detection and Alarm Systems. The type and frequency of ITM tasks for fire detection and alarm systems depend on whether the system is monitored or not. A monitored control panel is one where alarm, trouble, and supervisory signals are transmitted to a supervisory station. Guidance on the types of tasks outlined in Table 1 below is contained in the Inspection, Testing and Maintenance section of NFPA 72. Residential smoke detectors are addressed in Section 3 of this handbook.

Table 1  
Fire Detection and Alarm Systems

Frequency	Component	Task—Inspection, Test and Maintenance
Monthly	1. Control Panels and Annunciator Equipment (unmonitored only)	1. Visual inspection of panel condition (connections, fuses, LEDs)
Annual	1. Control Panel and Annunciator Equipment (monitored)	1. Test to verify proper receipt of alarm supervisory and trouble signals (inputs) and operation of notification appliances and auxiliary functions (outputs). 2. Verify all lamps and LEDs are illuminated. 3. Load test backup batteries (when provided).
	2. Initiating Devices: a. Fire Alarm Boxes	1. Verify box is accessible (visual).
	b. Radiant Energy Detectors	1. Test to verify alarm initiation and receipt. 2. Verify no facility change which affects performance
	c. Gas Detectors	1. Test to verify alarm initiation and receipt. 2. Verify no facility change which affects performance
	3. Notification Appliances and Voice Communication (telephone, speakers, horns, and strobe lights)	1. Test to verify operability.

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	4. Digital Alarm Transmitters and Receivers	1. Test to verify operability.
Bi-Annual (2 years)	1. Initiating Devices: a. Fire Alarm Boxes	1. Operate to verify alarm receipt.
	b. Heat Detectors (restorable)(only those required by Mil Handbook 1008)	1. Test with heat source to verify alarm initiating and receipt. 2. Verify no facility change which affects performance
	c. Smoke Detectors (only those required by Mil Handbook 1008)	1. Test with smoke or aerosol to verify smoke entry and alarm initiation and receipt. 2. Verify no facility change which affects performance.
	d. Supervisory Devices (low air, temperature, water level, etc.)	1. Test to verify initiation and receipt of supervisory alarm.
5 Years	1. Smoke Detectors (only those required by Mil Handbook 1008)	1. Test detector sensitivity to ensure the detector has remained within its listed and marked sensitivity range (or 4 percent obscuration light gray smoke, if not marked)
As Part of Building Inspection	Entire System	Visually Inspect System: 1. Detectors unblocked/uncovered. 2. Panels secured and indicator lamps functional. 3. Notification appliances in place. 4. Manual stations in place and unobstructed Exercise evacuation notification appliances for audibility, clarity, and visibility

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2.2.3 Wet Pipe Automatic Sprinkler Systems. The type and frequency of ITM tasks for Wet Pipe Automatic Sprinkler Systems are outlined below in Table 2. Technical guidance on the tasks is contained in NFPA 25. Residential sprinklers are addressed in Section 3 of this handbook.

Table 2  
Wet Pipe Sprinkler Systems

Frequency	Component	Task—Inspection, Test and Maintenance
Monthly	1. Control Valves (without lock or supervision)	1. Verify valve position.
Annual	1. Control Valves (locked or supervised)	1. Verify valve position.
	2. Waterflow Alarm Devices	1. Operate to verify initiation and receipt of alarm. 2. Verify alarm test valve alignment and tamper switch (if supervised).
	3. Alarm Valve and Trip	1. Visual external inspection of condition of valves, gauges, trim alignment. 2. Verify pressure and legibility of hydraulic nameplate.
	4. Main Drain	1. Conduct main drain test to verify supply (valve position, etc.)
	5. Fire Department Connection	1. Verify accessibility and condition. 2. If caps removed or missing, check for obstructions
Bi-Annual	1. Control Valves	1. Operate valve to verify operability. 2. Lubricate valve stem.
5 Years	1. Alarm Valve	1. Internal inspection and cleaning to verify condition.
	2. Anti-freeze Loops	1. Confirm correct solution mixture
10 Years	1. Gauges	1. Recalibrate or replace gauges.
20 Years	1. Fast Response Sprinklers and Extra High Temperature Heads	1. Test sample heads to verify response characteristics.
50 Years	1. Standard Sprinkler Heads	1. Replace or test sample heads to verify response characteristics.

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As Part of Building Inspection	Entire System	Visually Inspect System: 1. Check pipe hangers. 2. Check heads for obstruction. 3. Check piping for leaks. 4. Check riser condition. 5. Check sprinkler spares 6. Check area susceptible to freezing
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2.2.4 Dry Pipe Automatic Sprinkler Systems. The type and frequency of ITM tasks for Dry Pipe Automatic Sprinkler Systems are outlined below in Table 3. Technical guidance on the tasks is contained in NFPA 25.

Table 3  
Dry Pipe Sprinkler Systems

Frequency	Component	Task—Inspection, Test and Maintenance
Monthly	1. Control Valves (without lock or supervision)	1. Verify valve position.
Annual	1. Control Valves (locked or supervised)	1. Verify valve position.
	2. Waterflow Alarm Devices	1. Operate to verify initiation and receipt of alarm. 2. Verify alarm test valve alignment and tamper switch (if supervised).
	3. Dry Pipe Alarm Valve and Trip	1. Visual external inspection of condition of valves, gauges, trim alignment. 2. Verify pressure and legibility of hydraulic nameplate.
	4. Main Drain	1. Conduct main drain test to verify supply (valve position, etc.)
	5. Fire Department Connection	1. Verify accessibility and condition. 2. If caps removed or missing, check for obstructions.
	6. Dry Pipe Alarm Valve Enclosure Heating	1. Verify operability at beginning of heating season (for constant cold areas annually).
	7. Low Temperature Alarm	1. Verify initiation and receipt of alarm at beginning of heating season.
	8. Low Point Drains	1. Drain all low points to remove condensation prior to cold season.
Bi-Annual	1. Control Valves	1. Operate valve to verify operability. 2. Lubricate valve stem.

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	2. Dry Pipe Alarm Valves	<ol style="list-style-type: none"> <li>1. Trip valve to verify operability.</li> <li>2. Inspect internal condition before resetting and clean valve seat.</li> <li>3. Check priming water level (before and after trip test).</li> </ol>
	3. Quick Opening Devices	<ol style="list-style-type: none"> <li>1. Test to verify operability.</li> </ol>
	4. Low Air Pressure Alarm	<ol style="list-style-type: none"> <li>1. Test to verify initiation and receipt of supervisory alarm.</li> </ol>
	5. Automatic Air Pressure Maintenance Devices	<ol style="list-style-type: none"> <li>1. Inspect to verify proper operation.</li> </ol>
5 Years	1. Strainers	<ol style="list-style-type: none"> <li>1. Internal inspection and cleaning to verify condition.</li> </ol>
10 Years	1. Gauges	<ol style="list-style-type: none"> <li>1. Recalibrate or replace gauges.</li> </ol>
20 Years	1. Fast Response Sprinklers and Extra High Temperature Heads	<ol style="list-style-type: none"> <li>1. Test sample heads to verify response characteristics.</li> </ol>
50 Years	1. Standard Sprinkler Heads	<ol style="list-style-type: none"> <li>1. Replace or test sample heads to verify response characteristics.</li> </ol>
As Part of Building Inspection	Entire System	<p>Visually Inspect System:</p> <ol style="list-style-type: none"> <li>1. Check pipe hangers.</li> <li>2. Check heads for obstruction.</li> <li>3. Check piping for leaks.</li> <li>4. Check riser condition.</li> <li>5. Check sprinkler spares</li> </ol>

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2.2.5 Deluge Automatic Sprinkler Systems. The type and frequency of ITM tasks for Deluge Automatic Sprinkler Systems are outlined below in Table 4. Detection devices for actuation are addressed in Section 2.2.2. Technical guidance on the tasks is contained in NFPA 25.

Table 4  
Deluge Sprinkler Systems

Frequency	Component	Task—Inspection, Test and Maintenance
Monthly	1. Control Valves (without lock or supervision)	1. Verify valve position.
Annual	1. Control Valves (locked or supervised)	1. Verify valve position.
	2. Waterflow Alarm Devices	1. Operate to verify initiation and receipt of alarm. 2. Verify alarm test valve alignment and tamper switch (if supervised).
	3. Deluge Alarm Valve and Trip	1. Visual external inspection of condition of valves, gauges, trim alignment. 2. Verify pressure and legibility of hydraulic nameplate.
	4. Main Drain	1. Conduct main drain test to verify supply (valve position, etc.)
	5. Fire Department Connection	1. Verify accessibility and condition. 2. If caps removed or missing, check for obstructions.
	6. Valve and Riser Heated Enclosure (if provided)	1. Verify operability at beginning of heating season.
	7. Low Temperature Alarm	1. Verify initiation and receipt of alarm at beginning of heating season.
Bi-Annual	1. Control Valves	1. Operate valve to verify operability. 2. Lubricate valve stem.
	2. Deluge Valve	1. Trip to verify operability. 2. Verify manual actuators are operable. 3. Inspect internal condition and clean valve seat before resetting.
	3. Low Point Drains	1. Drain all low points after deluge valve test and before cold weather.

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5 Years	1. Strainers	1. Internal inspection and cleaning to verify condition.
10 Years	1. Gauges	1. Recalibrate or replace gauges.
	2. Deluge Valve	1. Conduct full flow test.
As Part of Building Inspection	Entire System	Visually Inspect System: 1. Check pipe hangers. 2. Check heads for obstruction. 3. Check piping for leaks. 4. Check riser condition. 5. Check sprinkler spares. 6. Detectors unblocked/uncovered. 7. Panels secured and indicator lamps functional. 8. Notification appliances in place. 9. Manual stations in place and unobstructed



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2.2.6. Pre-Action Automatic Sprinkler Systems. The type and frequency of ITM tasks for Pre-Action Automatic Sprinkler Systems are outlined below in Table 5. Detection devices for actuation are addressed in Section 2.2.2. Technical guidance on the tasks is contained in NFPA 25.

Table 5  
Pre-Action Sprinkler Systems

Frequency	Component	Task—Inspection, Test and Maintenance
Monthly	1. Control Valves (without lock or supervision)	1. Verify valve position.
Annual	1. Control Valves (locked or supervised)	1. Verify valve position.
	2. Waterflow Alarm Devices	1. Operate to verify initiation and receipt of alarm. 2. Verify alarm test valve alignment and tamper switch (if supervised).
	3. Pre-Action Valve and Trip	1. Visual external inspection of condition of valves, gauges, trim alignment. 2. Verify pressure and legibility of hydraulic nameplate.
	4. Main Drain	1. Conduct main drain test to verify supply (valve position, etc.)
	5. Fire Department Connection	1. Verify accessibility and condition. 2. If caps removed or missing, check for obstructions.
	6. Valve and Riser Heated Enclosure (if provided)	1. Verify operability at beginning of heating season.
	7. Low Temperature Alarm	1. Verify initiation and receipt of alarm at beginning of heating season.
Bi-Annual	1. Control Valves	1. Operate valve to verify operability. 2. Lubricate valve stem.
	2. Pre-Action Valve	1. Trip to verify operability. 2. Verify manual actuators (if provided). 3. Inspect internal condition and clean valve seat before resetting.
	3. Low Point Drains	1. Drain all low points after pre-action valve trip test and before cold weather (if unheated area).

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	4. Air supply (if present)	1. Test automatic air pressure maintenance device 2. Test low air supply alarm
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5 Years	1. Strainers	1. Internal inspection and cleaning to verify condition.
10 Years	1. Gauges	1. Recalibrate or replace gauges.
20 Years	1. Fast Response Sprinklers and Extra High Temperature Heads	1. Test sample heads to verify response characteristics.
50 Years	1. Closed Head Nozzles	1. Replace or test sample closed head nozzles to verify response characteristics.
As Part of Building Inspection	Entire System	Visually Inspect System: 1. Check pipe hangers. 2. Check heads for obstruction. 3. Check piping for leaks. 4. Check riser condition. 5. Manual stations in-place and unobstructed 6. Check sprinkler spares 7. Detectors unblocked/uncovered. 8. Panels secured and indicator lamps functional. 9. Notification appliances in place. 10. Manual stations in place and unobstructed

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2.2.7 Water Spray Systems. The type and frequency of ITM tasks for Water Spray Systems are outlined below in Table 6. Detection devices for actuation are addressed in Section 2.2.2. Technical guidance on the tasks is contained in NFPA 25.

Table 6  
Water Spray Systems

Frequency	Component	Task—Inspection, Test and Maintenance
Monthly	1. Control Valves (without lock or supervision)	1. Verify valve position.
Annual	1. Control Valves (locked or supervised)	1. Verify valve position.
	2. Waterflow Alarm Devices	1. Operate to verify initiation and receipt of alarm. 2. Verify alarm test valve alignment and tamper switch (if supervised).
	3. Pre-Action Valve and Trip	1. Visual external inspection of condition of valves, gauges, trim alignment. 2. Verify pressure and legibility of hydraulic nameplate.
	4. Main Drain	1. Conduct main drain test to verify supply (valve position, etc.)
	5. Fire Department Connection	1. Verify accessibility and condition. 2. If caps removed or missing, check for obstructions.
	6. Valve and Riser Enclosure Heater	1. Verify operability at beginning of heating season.
	7. Low Temperature Alarm	1. Verify initiation and receipt of alarm at beginning of heating season.
Bi-Annual	1. Control Valves	1. Operate valve to verify operability. 2. Lubricate valve stem.

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	2. Water Spray Valve	<ol style="list-style-type: none"> <li>1. Trip to verify operability.</li> <li>2. Verify manual actuators (if provided).</li> <li>3. Verify spray pattern (if experience shows nozzles are not moved, this can be extended to 10 years or after modifications).</li> <li>4. Inspect internal condition and clean valve seat before resetting.</li> </ol>
Bi-Annual	3. Low Point Drains	<ol style="list-style-type: none"> <li>1. Drain all low points after pre-action valve trip test and before cold weather.</li> </ol>
5 Years	1. Strainers	<ol style="list-style-type: none"> <li>1. Internal inspection and cleaning to verify condition.</li> </ol>
10 Years	1. Gauges	<ol style="list-style-type: none"> <li>1. Recalibrate or replace gauges.</li> </ol>
20 Years	1. Fast Response Sprinklers and Extra High Temperature Heads	<ol style="list-style-type: none"> <li>1. Test sample heads to verify response characteristics.</li> </ol>
50 Years	1. Standard Sprinkler Heads	<ol style="list-style-type: none"> <li>1. Replace or test sample heads to verify response characteristics.</li> </ol>
As Part of Building Inspection	Entire System	<p>Visually Inspect System:</p> <ol style="list-style-type: none"> <li>1. Check pipe hangers.</li> <li>2. Check heads for obstruction.</li> <li>3. Check piping for leaks.</li> <li>4. Check riser condition.</li> <li>5. Check sprinkler spares</li> <li>6. Manual stations in-place and unobstructed</li> <li>7. Detectors unblocked/uncovered.</li> <li>8. Panels secured and indicator lamps functional.</li> <li>9. Notification appliances in place.</li> <li>10. Manual stations in place and unobstructed</li> </ol>

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2.2.8 Water Mist Systems. The type and frequency of ITM tasks for Water Mist Systems are outlined below in Table 7. Detection devices for actuation are addressed in Section 2.2.2. Technical guidance on the tasks is contained in NFPA 750.

Table 7  
Water Mist Systems

Frequency	Component	Task—Inspection, Test and Maintenance
Weekly	1. Water Tanks (unsupervised, unmonitored)	1. Check water level.
	2. Air Compressor/Receiver/Cylinders (unsupervised, unmonitored)	1. Check air pressure.
Semi-Annual	1. Pumps	1. Churn test to ensure operability.
	2. Air Compressors	1. Start to ensure operability.
	3. System Operating Components	1. Visually inspect to verify valve alignment and free of damage.
Annual	1. Water Tanks (supervised and monitored)	1. Check water level and supervisory switch.
	2. Air Compressors/Receivers/Cylinders (supervised and monitored)	1. Check air pressure and supervisory pressure switch.
	3. Water Flow Alarm	1. Operate to verify initiation and receipt of alarm.
	4. Pumps	1. Full flow functional test.
	5. Pressure Relief Devices	1. Manually operate to ensure operability.
	6. Manual Actuators	1. Verify operability.
	7. Control Valve (sectional water supply valve)	1. Verify operability and position.
5 Years	1. Pressure cylinders (normally at atmospheric pressure)	1. Pressurize to verify operability.
	2. System	1. Flow test.
	3. Water	1. Verify water quality when refilling.
	4. Water Tanks	1. Inspect tanks for structural integrity prior to refilling.

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	5. Nozzle Sampling	1. Test sample heads to verify response characteristics.
5-12 Years	1. Storage Vessels	1. Conduct hydrostatic test for pressure cylinders in accordance with OSHA and DOT standards.
As Part of Building Inspection	Entire System	Visually Inspect System: 1. Check pipe hangers. 2. Check heads for obstruction. 3. Check piping for leaks. 4. Check riser condition. 5. Check nozzle spares 6. Detectors unblocked/uncovered. 7. Panels secured and indicator lamps functional. 8. Notification appliances in place. 9. Manual stations in place and unobstructed

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2.2.9 Foam and Foam-Water Systems. The tasks and frequency of ITM activities are broken down into three tables below. Table 8 addresses low expansion foam systems for flammable liquid tanks as covered in NFPA 11. Table 9 addresses low expansion foam spray and sprinkler systems including AFFF, as covered in NFPA 16, 16A, and 25. Table 10 addresses high expansion foams as covered in NFPA 11A.

Table 8  
Low Expansion Foam Systems for Flammable Liquid Tanks

Frequency	Component	Task—Inspection, Test and Maintenance
Annual	1. Foam Concentrate	1. Inspect for quality and evidence of sludge or deterioration.
	2. Foam Pumps/Proportioners	1. Test to verify operability and proper proportioning. 2. Flush pumps after operation.
	3. System Actuators	1. Verify all manual and automatic actuation functions.
	4. Foam Concentrate Strainers	1. Inspect and clean if necessary.
	5. Distribution/Discharge	1. Inspect discharge devices are free of damage. 2. Inspect pipe and hanger to verify support and pitch.
5 Years	1. Distribution Piping (including underground)	1. Spot check piping interior for evidence of deterioration.
	2. Strainers (water supply)	1. Inspect and clean if necessary.

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Table 9  
Foam Spray and Sprinkler Systems

Frequency	Component	Task—Inspection, Test and Maintenance
Monthly	1. Control Valves (unsupervised and unmonitored)	1. Verify valve in open (proper) position.
Semi-Annual	1. Foam Concentrate	1. Verify adequate supply and foam quality.
	2. Foam Proportioning System	1. Test pump to ensure operability. 2. Inspect proportioning system for proper valve alignment and system condition.
Annual	1. Control Valves (supervised and monitored)	1. Verify valve in proper position.
	2. Foam Concentrate Strainers	1. Inspect external condition to ensure blow down valve is closed.
Bi-Annual	1. Control Valve	1. Operate valve to verify operability. 2. Lubricate stem.
	2. Foam Proportioning System	1. Conduct full flow test to ensure proper system function. 2. Verify proper concentration.
	3. Actuators	1. Verify operability of manual and automatic actuators.
	4. Distribution System	1. Verify nozzle (head) coverage during flow test. 2. Inspect piping hangers, heads, and nozzles for condition and location.
	5. Foam Concentrate Strainers	1. Inspect and clean after flow test.
5 Years	1. Balancing Valve	1. Flush to prevent concentrate build-up on diaphragm.
	2. Strainers (water supply)	1. Inspect and clean if necessary.
10 Years	1. Foam Concentrate Tank	1. Drain, flush and perform internal inspection for corrosion. If pressure vessel, perform hydrostatic test.
As Part of Building Inspection	Entire System	Visually Inspect System: 1. Check pipe hangers. 2. Check heads for obstruction. 3. Check piping for leaks.



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		<ul style="list-style-type: none"><li>4. Check riser condition</li><li>5. Detectors unblocked/uncovered.</li><li>6. Panels secured and indicator lamps functional.</li><li>7. Notification appliances in place.</li><li>8. Manual stations in place and unobstructed</li><li>9. Check sprinkler spares</li></ul>
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Table 10  
High Expansion Foam

Frequency	Component	Task—Inspection, Test and Maintenance
Annual	1. Foam Concentrate	1. Inspect to verify adequate supply.
	2. Foam Generator	1. Inspect to verify condition and proper valve alignment.
Bi-Annual (2 years)	1. Foam Generator	1. Conduct discharge test to verify operability.
	2. Actuators	1. Verify all manual and automatic actuators function.
After Activation	1. Strainers	1. Inspect and clean after system actuation.
As Part of Building Inspection	Entire System	Visually Inspect System: 1. Check pipe hangers. 2. Check heads for obstruction. 3. Check piping for leaks. 4. Check riser condition. 5. Detectors unblocked/uncovered. 6. Panels secured and indicator lamps functional. 7. Notification appliances in place. 8. Manual stations in place and unobstructed

2.2.10 Standpipe Systems. The type and frequency of ITM tasks for Standpipe Systems are outlined below in Table 11. Detection devices for actuation are addressed in Section 2.2.2. Technical guidance on the tasks is contained in NFPA 14 and 25.

Table 11  
Standpipe Systems

Frequency	Component	Task—Inspection, Test and Maintenance
Semi-Annual	1. Hose Connection and Pressure Reducing Valves	1. Inspect for damage, leaking, missing caps, and obstruction.
Bi-Annual (2 years)	1. Piping	1. Inspect for damage and pipe supports.
5 Years	1. Standpipe	1. Conduct flow test to verify flow capacity. 2. Hydrostatic test to ensure integrity.
As Part of Building	Entire System	Visually Inspect System: 1. Check pipe hangers.

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Inspection		2. Check connections for obstruction. 3. Check piping for leaks. 4. Check riser condition.
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2.2.11 Hydrants and Monitors. The type and frequency of ITM tasks for Hydrants and Monitors are outlined below in Table 12. Technical guidance on the tasks is contained in NFPA 25.

Table 12  
Hydrants and Yard Monitors

Frequency	Component	Task-Inspection, Test and Maintenance
Bi-Annual (2 years)	1. Hydrants	1. Inspect for accessibility, leaks, and worn threads. 2. Operate to ensure proper functioning. 3. Verify drainage of barrel (after all operations and before cold weather). 4. Lubricate hydrant to ensure ease of operation.
	2. Yard Monitor Nozzles	1. Inspect for condition. 2. Conduct flow test to verify proper function and range of motion. 3. Lubricate to ensure proper operating conditions.
	3. Hose Houses	1. Inspect for accessibility and physical condition. 2. Verify inventory and its condition.
5 Years	1. Underground and exposed piping.	2. Conduct flow tests
After Flow	1. Strainers	1. Inspect and clean after each flow.

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2.2.12 Fire Pumps. The type and frequency of ITM tasks for Fire Pumps are outlined below in Table 13. Technical guidance on the tasks is contained in NFPA 20 and 25.

Table 13  
Fire Pumps

Frequency	Component	Task—Inspection, Test and Maintenance
Monthly	1. Pump House	1. Inspect for proper condition, ventilation and heating.
	2. Control Valve and Isolation Valve	1. Verify proper valve position.
	3. Pressure Gauges	1. Check reading and verify gauge operability.
	4. Controllers	1. Inspect electric connections. 2. Operate manual and automatic stations.
	5. Batteries	1. Verify proper charge.
	6. Pumps	1. Start and churn to verify operability. (Where provisions exist for flowing water back to the source they shall be used) 2. Verify relief valves operate. 3. Verify full level (for engine-driven pumps) 4. Inspect exhaust system for leaks (for engine-driven pumps).
Bi-Annual (2 years)	1. Control Valve	1. Operate and lubricate valves to ensure operability.
	2. Controllers	1. Calibrate pressure switches. 2. Exercise circuit breakers and switches to verify operability. 3. Inspect fuses.
	3. Pumps	1. Check coupling alignment to ensure shaft aligned. 2. Check pump shaft end play. 3. Lubricate bearings. 4. Lubricate couplings. 5. Lubricate right-angle drives.
	4. Fuel (Engine-Driven Pumps)	1. Sample fuel to verify quality.

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Bi-Annual (2 Years)	5. Relief Valves	1. Calibrate relief valves.
	6. Emergency Power Supply	1. Test to verify availability and capacity for pump motor.
5 Years	1. Pump	1. Conduct flow test to verify pump output.

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2.2.13 Water Supply Tanks. The type and frequency of ITM tasks for Water Supply Tanks are outlined below in Table 14. Technical guidance on the tasks is contained in NFPA 25.

Table 14  
Water Supply Tanks

Frequency	Component	Task—Inspection, Test and Maintenance
Weekly (During freezing weather)	1. Tank Heating System (unsupervised and unmonitored)	1. Verify water temperature. 2. Verify operability of tank heaters.
Monthly	1. Control Valves (unsupervised and unmonitored)	1. Verify proper valve position.
Quarterly	1. Water Level (unsupervised and unmonitored)	1. Verify proper water level in tank.
Annual	1. Control Valves	1. Verify proper valve position.
	2. Water Level	1. Verify proper water level in tank.
	3. Tank Heating System	1. Verify operability of tank heater (prior to cold weather). 2. Test temperature alarms to verify proper operation (maintain thermometer in accordance with manufacturer's recommendations).
	4. Tank	1. Inspect exterior for condition, damage, corrosion, and accessibility. 2. Verify air pressure (for pressure tanks).
	5. Cathodic Protection	1. Inspect to ensure proper operation.
Bi-Annual (2 years)	1. Control Valves (including drain valves)	1. Operate and lubricate valves to ensure operability.
	2. Water Level Alarms and Level Indicators	1. Test water level alarms to verify operability and set points.
	3. Tank Vent	1. Inspect and clean tank vents.
3 Years	1. Tank (without cathodic protection)	1. Conduct internal tank inspection to determine condition and level of corrosion.
5 Years	1. Tanks (with cathodic protection)	1. Conduct internal tank inspection to determine condition and level of corrosion.

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	2. Pressure Gauges	1. Calibrate pressure gauges.
	3. Check Valves	1. Inspect interior of check valves.
	4. Level indicator test	1. Calibrate level indicator

2.2.14 Dry Chemical System. The type and frequency of ITM tasks for Dry Chemical Systems are outlined below in Table 15. Detection devices for actuation are addressed in Section 2.2.2. Technical guidance on the tasks is contained in NFPA 17.

Table 15  
Dry Chemical Systems

Frequency	Component	Task—Inspection, Test and Maintenance
Semi-Annual	1. Piping	1. Inspect piping for obstructions and proper support.
	2. Storage Vessels	1. Inspect agent container for condition. 2. Verify storage pressure of propelletizer.
	3. Agent	1. Verify quantity and quality of agent.
	4. Actuators	1. Inspect manual actuators for accessibility. 2. Inspect detection devices (fusible links or heat detectors) for contamination, and clean or replace as necessary. 3. Test actuation system without agent release.
5-12 Years	1. Storage Vessels	1. Conduct hydrostatic test for pressure cylinders in accordance with OSHA and DOT standards.
As Part of Building Inspection	Entire System	Visually Inspect System: 1. Check pipe hangers. 2. Check heads for obstruction. 3. Check riser condition. 4. Detectors unblocked/uncovered. 5. Panels secured and indicator lamps functional. 6. Notification appliances in place. 7. Manual stations in place and unobstructed 8. Nozzle covers in place



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2.2.15 Wet Chemical Systems. The type and frequency of ITM tasks for Wet Chemical Systems are outlined below in Table 16. Detection devices for actuation are addressed in Section 2.2.2. Technical guidance on the tasks is contained in NFPA 17A.

Table 16  
Wet Chemical Systems

Frequency	Component	Task—Inspection, Test and Maintenance
Semi-Annual	1. Piping	1. Inspect piping for obstructions and proper support.
	2. Storage Vessels	1. Inspect agent container for condition. 2. Verify storage pressure of propelletizer.
	3. Agent	1. Verify quantity and quality of agent.
	4. Actuators	1. Inspect manual actuators for accessibility. 2. Inspect detection devices (fusible links or heat detectors) for contamination, and clean or replace as necessary. 3. Test actuation system without agent release.
5-12 Years	1. Storage Vessels	1. Conduct hydrostatic test for pressure cylinders in accordance with OSHA and DOT standards.
As Part of Building Inspection	Entire System	Visually Inspect System: 1. Check pipe hangers. 2. Check heads for obstruction. 3. Check riser condition. 4. Detectors unblocked/uncovered. 5. Panels secured and indicator lamps functional. 6. Notification appliances in place. 7. Manual stations in place and unobstructed 8. Nozzles covers in place

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2.2.16 Halon Systems. The type and frequency of ITM tasks for Halon Systems are outlined below in Table 17. Detection devices for actuation are addressed in Section 2.2.2. Technical guidance on the tasks is contained in NFPA 12A.

Table 17  
Halon Systems

Frequency	Component	Task—Inspection, Test and Maintenance
Annual	1. Piping	1. Inspect piping and nozzles for condition and orientation.
	2. Flexible Hoses	1. Inspect for damage.
	3. Storage Vessels	1. Inspect storage containers' exterior (tanks, spheres, cylinders, etc.).
	4. Agent and Propellant	1. Verify quantity of agent is sufficient. 2. Verify pressure of agent/propellant is sufficient.
	5. Actuators	1. Inspect manual actuators for accessibility. 2. Test actuation without agent release.
	6. Auxiliary Equipment	1. Test to verify interfaces (equipment shutdown, dampers, door closures, etc.) operate properly and are activated by the system actuation.
	7. Valves	1. Verify valves in proper alignment.
5 Years	1. Cylinders	1. Complex external inspection of non-discharged cylinders to ensure suitability for use.
	2. Flexible Hoses	1. Pressure test hoses to ensure suitability for use.
Bi-Annual (2 Years) (and after modifications to compartment)	1. Protected Enclosure (Room)	1. Inspect the enclosure to verify integrity and ability to maintain agent concentration.
As Part of Building Inspection	Entire System	Visually Inspect System: 1. Check pipe hangers. 2. Check heads for obstruction. 3. Check piping for leaks. 4. Check riser condition. 5. Detectors

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		unblocked/uncovered. 6. Panels secured and indicator lamps functional. 7. Notification appliances in place. 8. Manual stations in place and unobstructed 9. Nozzles covers in place
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2.2.17 Clean Agent Systems. The type and frequency of ITM tasks for Clean Agent Systems are outlined below in Table 18. Detection devices for actuation are addressed in Section 2.2.2. Technical guidance on the tasks is contained in NFPA 2001.

Table 18  
Clean Agent Systems

Frequency	Component	Task—Inspection, Test and Maintenance
Annual	1. Piping	1. Inspect piping and nozzles for condition and orientation.
	2. Flexible Hoses	1. Inspect for damage.
	3. Storage Vessels	1. Inspect storage containers' exterior (tanks, spheres, cylinders, etc.).
	4. Agent and Propellant	1. Verify quantity of agent is sufficient. 2. Verify pressure of agent/propellant is sufficient.
	5. Actuators	1. Inspect manual actuators for accessibility. 2. Test actuation without agent release.
	6. Auxiliary Equipment	1. Test to verify interfaces (equipment shutdown, dampers, door closures, etc.) operate properly and are activated by the system actuation.
	7. Valves	1. Verify valves in proper alignment.
5 Years	1. Cylinders	1. Complex external inspection of non-discharged cylinders to ensure suitability for use.
	2. Flexible Hoses	1. Pressure test hoses to ensure suitability for use.

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Bi-Annual (2 Years) (and after modifications to compartment)	1. Protected Enclosure (Room)	1. Inspect the enclosure to verify integrity and ability to maintain agent concentration.
As Part of Building Inspection	Entire System	Visually Inspect System: 1. Check pipe hangers. 2. Check heads for obstruction. 3. Check piping for leaks. 4. Check riser condition. 5. Detectors unblocked/uncovered. 6. Panels secured and indicator lamps functional. 7. Notification appliances in place. 8. Manual stations in place and unobstructed 9. Nozzles covers in place

2.2.18 Carbon Dioxide Systems. The type and frequency of ITM tasks for Carbon Dioxide Systems are outlined below in Table 19. Detection devices for actuation are addressed in Section 2.2.2. Technical guidance on the tasks is contained in NFPA 12.

Table 19  
Carbon Dioxide Systems

Frequency	Component	Task—Inspection, Test and Maintenance
Semi-Annual	1. Liquid Level (low pressure CO <sub>2</sub> )	1. Verify adequate liquid level with tank level gauge.
Annual	1. Piping and Nozzles	1. Inspect piping for condition and proper support. 2. Check nozzles for obstruction and alignment.
	2. Flexible Hoses	1. Inspect for damage.
	3. Low Pressure Tanks	1. Check level and pressure gauges. 2. Verify valve alignment.
	4. High Pressure Cylinders	1. Inspect for condition and securing.

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	5. Actuation System	<ol style="list-style-type: none"> <li>1. Exercise control panel function including zone valve operation.</li> <li>2. Inspect manual actuators for accessibility.</li> <li>3. Check times and time delay (pre-discharge).</li> </ol>
	6. Auxiliary Equipment	<ol style="list-style-type: none"> <li>1. Test to verify interfaces (shutdown, door closers, dampers, etc.) operate properly and are activated by the control panel.</li> </ol>
Bi-Annual (2 Years)	1. High Pressure Cylinders	<ol style="list-style-type: none"> <li>1. Verify CO<sub>2</sub> quantity by weighing cylinders.</li> </ol>
As Part of Building Inspection	Entire System	<p>Visually Inspect System:</p> <ol style="list-style-type: none"> <li>1. Check pipe hangers.</li> <li>2. Check heads for obstruction.</li> <li>3. Check piping for leaks.</li> <li>4. Check riser condition.</li> <li>5. Detectors unblocked/uncovered.</li> <li>6. Panels secured and indicator lamps functional.</li> <li>7. Notification appliances in place.</li> <li>8. Manual stations in place and unobstructed</li> <li>9. Nozzles covers in place</li> </ol>

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## Section 3: RESIDENTIAL PROTECTION SYSTEMS

3.1 Scope. The maintenance concepts for military family housing (MFH) fire protection systems are based on the management and controls unique to the MFH program. Traditional maintenance concept for residential occupancies is based on owner or tenant occupancy. This owner/tenant makes a personal choice to occupy the dwelling unit and is responsible for the maintenance/repair of the units and the associated fire protection devices. Occupants in military family housing are assigned housing units and the housing management activity is responsible for the maintenance/repair of the units and the associated fire protection devices. Each MFH occupant is required to attend a briefing on their responsibilities as a MFH occupant prior to occupying a new MFH dwelling. These briefings include the occupants responsibilities for conducting occupant testings and cleaning of installed fire protection features. On average, MFH maintenance teams conduct a "change of occupancy" maintenance every 1 to 2 years, therefore the scheduled maintenance of the fire protection features by the housing management activity is centered around this "change of occupancy" maintenance action.

3.1.1 Residential Smoke Detectors. All military family housing units are required to have hard wired smoke detectors installed. Local installations develop occupant education programs to train occupants in the testing and maintenance actions required for the specific smoke detector installed. The testing and maintenance actions required as part of change of occupant maintenance by the housing management activity are listed in Table 3.2.1.

3.1.2 Residential Sprinkler Systems. Some military family housing units are provided with sprinkler systems in addition to the required residential smoke detectors.

3.1.2.1 Residential sprinkler systems in multi-family buildings up to 4 stories are normally constructed in accordance with NFPA 13R *Sprinkler Systems, Residential Occupancies Up To and Including 4 Stories*. These systems are maintained in accordance with the tables in Chapter 2 of this handbook. Occupants in these facilities are not expected to conduct any testing or maintenance actions.

3.1.2.2 Residential sprinkler systems in multi-family buildings over 4 stories are normally constructed in accordance with NFPA 13 *Sprinkler Systems*. These systems are maintained in accordance with the tables in Chapter 2 of this handbook. Occupants in these facilities are not expected to conduct any testing or maintenance actions.

3.1.2.3 Residential sprinkler systems in one- and two-family dwellings and townhouse style units are normally constructed in accordance with NFPA 13D *Sprinkler Systems, Dwellings*. Local installations develop occupant education programs to train occupants in the testing and maintenance actions required. The testing and maintenance actions required as part of change of occupant maintenance by the housing management activity are listed in Table 3.2.1.

## 3.2 ITM Task Descriptions.

3.2.1 ITM Task. The ITM tasks below are expected to be accomplished during the housing maintenance normally conducted after one occupant has moved out of the housing unit and prior to the next occupant beginning to move in.

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Table 20  
MFH Residential Smoke Detectors

Frequency	Component	Task—Inspection, Test and Maintenance
Change of Occupancy	1. Smoke Detector	<ol style="list-style-type: none"> <li>1. Activate each detector with an approved smoke simulant.</li> <li>2. Remove cover and inspect for grease build-up; replace and relocate detector with evidence of grease build-up in the detector.</li> <li>3. Vacuum the detector and replace the cover.</li> <li>4. Activate each detector with the installed test button</li> <li>5. Replace any detector failing to activate on either the smoke simulant or the test button.</li> </ol>
	2. Back-up Battery (if present)	1. Replace battery (if present).
10 Years	1. Smoke Detectors	1. Replace detectors with supplemental/backup batteries or test detector sensitivity to ensure the detector has remained within its listed and marked sensitivity range (or 4 percent obscuration light gray smoke, if not marked).
25 Years	1. Smoke Detectors (hard-wired without battery backup)	1. Replace detectors.

Table 21  
Residential Sprinkler Systems

Frequency	Component	Task—Inspection, Test and Maintenance
Change of Occupancy	1. Sprinkler Heads	<ol style="list-style-type: none"> <li>1. Inspect all heads.</li> <li>2. Clean or replace heads (as necessary).</li> <li>3. Inspect ceilings/wall at head for signs of leakage or water stains.</li> </ol>



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	2. Valves	1. Inspect all valves to ensure they are open and sealed.
	3. Waterflow and Alarm Devices	1. Test to verify operability.
	1. Fast Response Sprinkler Heads	1. Test a sample of heads or replace.
20 Years		

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## References

Note: The following reference documents form a part of this handbook to the extent specified herein. Users of this handbook should refer to the latest revision of cited documents unless otherwise directed.

### Non-Government Publications

Unless otherwise indicated, copies are available from the National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 11: Standard for Low-Expansion Foam, 1998 Edition

NFPA 11A: Standard for Medium-and High-Expansion Foam Systems

NFPA 12: Standard on Carbon Dioxide Extinguishing Systems

NFPA 12A: Standard on Halon 1301 Fire Extinguishing Systems

NFPA 13: Standard for the Installation of Sprinkler Systems

NFPA 14: Standard for the Installation of Standpipe and Hose Systems

NFPA 15: Standard for Water Spray Fixed Systems for Fire Protection

NFPA 16: Standard for the Installation of Deluge Foam-Water Sprinkler  
And Foam-Water Spray Systems

NFPA 16A: Standard for the Installation of Closed-Head Foam-Water  
Sprinkler Systems

NFPA 17: Standard for Dry Chemical Extinguishing Systems

NFPA 17A: Standard for Wet Chemical Extinguishing Systems

NFPA 20: Standard for the Installation of Centrifugal Fire Pumps

NFPA 22: Standard for Water Tanks for Private Fire Protection

NFPA 25: Standard for the Inspection, Testing and Maintenance of Water  
Based Fire Protection Systems

NFPA 72: National Fire Alarm Code

NFPA 750: Standard on Water Mist Fire Protection Systems

NFPA 2001: Standard on Clean Agent Fire Extinguishing Systems